

Atty. Docket 24347-051 US
USSN 09/845,016

Section 3, Status of Pending Claims:

In the Claims:

No amendments of the claims pending in this case are made here.

Claims 1 – 4, 7, 11, 14, 17, 22, 24 and 28 (Previously Amended);

Claims 12, 13, 18, 21, 23 and 30 (Original);

Claims 5, 8 – 10, 15, 16, 19, 20, 25 – 27 and 29 (Previously Canceled); and

Claims 31 – 53 (Previously Added)

A clean set of all claims as presently pending in this case, in proper sequence or related claims is presented herewith:

1) Method for reducing the danger to vehicular passengers and animals of heat prostration or suffocation upon being trapped in a hot, closed vehicle comprising the steps of:

a) determining the occupancy state of a vehicle interior space, including evaluating data extracted from a sensor system employing an ultrasound unit;

b) monitoring the temperature of at least one of a vehicle interior space and the exterior ambient temperature by extracting temperature data from at least one output of said ultrasound unit;

c) triggering at least one of an interior alert, an exterior alert, a heat relief measure, and a passenger release measure in response to said vehicle interior space occupancy state being determined as occupied, and in response to the monitored temperature satisfying a predetermined criteria.

2) Method as in claim 3 which includes the step of:

a) sensing a vehicle stopped condition selected from vehicle ignition state, vehicle electrical system activity, vehicle accelerometer activity or history, odometer activity, amount of road vibration, GPS location updates, engine activity, external motion sensing, trunk or door open/closed, parking brake on, and occupancy state history; and wherein said triggering includes evaluating said sensed vehicle condition.

3) Method as in claim 1 wherein said temperature monitored is the temperature of at least one vehicle interior space selected from a passenger compartment and a load space.

4) Method as in claim 3 wherein said occupancy state sensing steps includes the step of evaluating the output of at least one additional sensor selected from an ultrasound sensor, an IR

Atty. Docket 24347-051 US
USSN 09/845,016

sensor, an imaging sensor, a microphone, a seat sensor, a capacitance sensor, a motion sensor, and a floor sensor, or the occupancy history.

6) Method as in claim 1 which includes the steps of progressively triggering at least two of said interior warning, said exterior warning, said passenger/animal relief and said passenger/ animal release.

7) Method as in claim 6 wherein;

a) said step of triggering said interior warning includes activating at least one of a voice announcement, a warning sound, and an illuminated warning;

b) said step of triggering said exterior warning includes activating at least one of vehicle lights, sounding a vehicle horn, sounding an alarm system siren, and an outbound RF message;

c) said step of triggering said passenger/animal relief includes activating at least one of opening at least one window or roof panel, turning on a fan, turning on a vehicle AC system, deploying shading, increasing reflectivity, and providing location information to rescuers; and

d) said step of triggering said passenger/animal release includes activating at least one of a seat belt release, unlocking a door, opening a window or roof panel and deploying a ramp or lift.

47) Method as in claim 1 wherein said predetermined temperature criteria include at least one of absolute temperature value and rate of temperature rise over time.

48) Method as in claim 47 wherein the frequency of extraction of temperature data from said ultrasound unit output increases when the absolute temperature of said vehicle interior space reaches a preselected value.

49) Method as in claim 47 wherein at least one of said triggerings occurs when the vehicle is detected as not running and a door, trunk lid or load compartment access door is detected as sequencing open/close, said ultrasound unit is awakened to monitor at least one of interior and exterior temperature for said triggering determination, in part to protect against "crawl-in" type entrapment of children.

11) Method for providing an alert to assist in avoiding development of a heat condition in the interior of a vehicle that is dangerous to non-abled human and animal occupants, comprising the steps of:

a) providing a reminder device for the vehicle driver and able passengers of the presence of non-abled vehicle occupants,

b) arming said reminder device upon inclusion of at least one non-abled occupant in said vehicle;

c) sensing a condition of at least one of said driver or an able passenger leaving said vehicle, vehicle ignition OFF after a period of ignition ON, vehicle stopped, and at least one of the driver and an able passenger door opening or/and closing;

d) monitoring the temperature in the vehicle space in which said non-abled vehicle occupant is located by extraction of temperature data from the output of at least one ultrasound transducer; and

e) triggering said reminder upon both said monitored temperature satisfying a predetermined criteria and at least one of said sensed conditions occurring so that said reminder device can alert at least one of said driver and said able passenger to not leave said non-abled occupant untended in the vehicle to suffer from heat-induced injury.

12) Method as in claim 10 wherein said alert is selected from at least one of a light, a lighted message, a sound alarm and a voice announcement.

13) Method as in claim 11 which includes the added step of triggering at least one of an exterior alert, a heat relief measure and a release measure in response to at least one of said sensed conditions occurring.

14) Method as in claim 13 wherein;

a) said step of triggering said exterior warning includes activating at least one of vehicle lights, sounding a vehicle horn, sounding an alarm system siren, and an outbound RF message;

b) said step of triggering said passenger/animal relief includes activating at least one of opening at least one window or roof panel, turning on a fan, turning on a vehicle AC system, deploying shading, increasing reflectivity, and providing location information to rescuers; and

c) said step of triggering said passenger/animal release includes activating at least one of a seat belt release, unlocking a door or trunk, unlocking or opening a window or roof panel and deploying a ramp or lift.

50) Method as in claim 11 wherein said predetermined temperature criteria include at least one of absolute temperature value and rate of temperature rise over time.

51) Method as in claim 50 wherein the frequency of extraction of temperature data from said

ultrasound unit output increases when the absolute temperature of said vehicle interior space reaches a preselected value.

17) Apparatus system for reminding or warning against development of excess heat conditions in vehicle passenger and/or load spaces, comprising in operative combination:

a) at least one temperature sensor for monitoring the ambient temperature of at least one of a vehicle interior space and the exterior, comprising at least one ultrasound transponder unit;

b) a controller which includes a signal processing algorithm for extraction of temperature data from an input from said ultrasound transponder unit, a state and temperature history database, and a control algorithm including a set of temperature criteria for at least one of reminder and warning activation triggers; and

c) at least one warning device mounted in association with said vehicle triggered by said controller in response to the monitored temperature satisfying a predetermined criteria, for at least one of:

i) reminding against leaving a non-abled passenger or animal in the vehicle; and

ii) warning of at least one sensed temperature condition exterior or interior of said vehicle that tends toward danger for a non-abled passenger or animal in said vehicle space.

18) System as in claim 17 wherein said warning device comprises an initializable sound or visual reminder unit electrically linked to at least one vehicle door open/close sensor, so that after initializing, upon said vehicle door being sensed as opened or/and closed, said reminder unit warning is activated.

21) System as in claim 17 wherein said warning device is responsive to a predetermined temperature being sensed.

22) System as in claim 21 wherein:

a) said system includes at least one vehicle stopped condition sensor that provides an output to said controller of at least one of vehicle ignition state, vehicle accelerometer activity or history, vehicle electrical system activity, odometer activity, amount of road vibration, GPS location updates, engine activity, external motion sensing, trunk or door open/close, parking brake on, and occupancy state;

b) said controller evaluates said temperature sensed and said vehicle condition output; and

c) said controller, in response to evaluation by said algorithm that at least one preselected set of temperature and vehicle conditions has been met, triggers said warning device.

Atty. Docket 24347-051 US
USSN 09/845,016

23) System as in claim 22 wherein said controller progressively triggers at least two of an interior vehicle warning, an exterior warning, a passenger/animal relief measure and a passenger/animal release measure.

24) System as in claim 23 wherein;

a) said interior warning is selected from a voice announcement, a warning sound, and an illuminated warning;

b) said exterior warning is selected from flashing vehicle lights, sounding a horn, sounding an alarm system siren, and an RF call out;

c) said passenger/animal relief is selected from opening at least one window or roof panel, turning on a fan, turning on a vehicle AC system, deploying shading, darkening or increasing reflectivity of windows, and providing location information to rescuers; and

d) said passenger/animal release is selected from disconnecting a seatbelt, unlocking a door, opening a window or roof panel, opening a door, and deploying a ramp or lift.

28) System as in claim 22 wherein said vehicle condition occupancy state sensor comprises at least one of an ultrasound sensor, an IR sensor, an imaging sensor, a microphone, a seat sensor, a floor sensor, a capacitance sensor, and a motion sensor.

52) System as in claim 28 wherein said occupancy state sensor comprises a linear array of transducers, and the input to the controller therefrom is selectively evaluated for at least one of a Head Zone, a seat zone, a floor zone and side scan for window position.

30) A computer readable media storing computer executable instructions that, when executed by at least one processor, performs the method of claim 1.

31) In a method of reducing the danger to vehicular passengers and animals of heat prostration or suffocation upon being trapped in a hot, closed vehicle, in which interior temperature of an occupied vehicle is sensed, and in response to said temperature an excessive temperature warning signal is generated, the improvement comprising the step of triggering a release measure in response to said excess temperature signal.

32) Improved method as in claim 31 which includes the step of:

a) sensing a vehicle stopped condition selected from vehicle ignition state, vehicle accelerometer activity or history, vehicle electrical system activity, odometer activity, amount of road vibration, GPS location updates, engine activity, external motion sensing, trunk or door

open/closed, parking brake on, and occupancy state history; and wherein said passenger release triggering includes evaluating said sensed vehicle condition.

33) Improved method as in claim 32 wherein said temperature monitored is the temperature of at least one vehicle interior space selected from a passenger compartment and a load space.

34) Improved method as in claim 33 wherein said occupancy state sensing steps includes the step of evaluating the output of at least one sensor selected from an ultrasound sensor, an IR sensor, an imaging sensor, a microphone, a seat sensor, a capacitance sensor, a motion sensor, and a floor sensor.

35) Improved method as in claim 31 wherein said temperature monitoring step includes extracting temperature data from an ultrasound sensor.

36) Improved method as in claim 31 which includes the steps of progressively triggering at least one of an interior warning, an exterior warning, and a passenger/animal relief measure, followed by triggering said passenger/animal release.

37) Improved method as in claim 36 wherein;

a) said step of triggering said interior warning includes activating at least one of a voice announcement, a warning sound, and an illuminated warning;

b) said step of triggering said exterior warning includes activating at least one of vehicle lights, sounding a vehicle horn, sounding an alarm system siren, and an outbound RF message;

c) said step of triggering said passenger/animal relief includes activating at least one of opening at least one window or roof panel, turning on a fan, turning on a vehicle AC system, deploying shading, increasing reflectivity, and providing location information to rescuers; and

d) said step of triggering said passenger/animal release includes activating at least one of a seat belt release, unlocking a door or trunk, unlocking or opening a window or roof panel and deploying a ramp or lift.

38) Improved method as in claim 31 wherein said predetermined temperature criteria include at least one of absolute temperature value and rate of temperature rise over time

39) Improved method as in claim 38 wherein the frequency of extraction of temperature data from said ultrasound unit output increases when the absolute temperature of said vehicle interior space reaches a preselected value.

40) Improved method as in claim 38 wherein at least one of said triggerings occurs when

the vehicle is detected as not running and a door, trunk lid or load compartment access door is detected as sequencing open/close, said ultrasound unit is awakened to monitor at least one of interior and exterior temperature for said triggering determination, in part to protect against "crawl-in" type entrapment of children.

41) Apparatus system for reducing the danger to vehicular passengers and animals of heat prostration or suffocation upon being trapped in a hot, closed vehicle comprising in operative combination:

- a) at least one temperature sensor for monitoring at least one of a vehicle interior space and the exterior ambient temperature;
- b) a controller receiving an output of said temperature sensor, a state and temperature history database, and a control algorithm including a set of temperature criteria for triggering at least one passenger/animal release measure in response to a predetermined temperature being sensed; and
- c) at least one passenger/animal release activator connected to said controller for releasing at least one of a passenger/animal restraint or unlocking or opening an exit or escape passage.

42) Apparatus system as in claim 41 wherein said release activator includes at least one of a seat belt release, a door or trunk lock, a window or roof panel opener and a ramp or lift deploy unit.

43) Apparatus system as in claim 41 which includes at least one vehicle stopped condition sensor that provides an output to said controller of at least one of vehicle ignition state, vehicle electrical system activity, odometer activity, amount of road vibration, GPS location updates, engine activity, external motion sensing, trunk or door open/close, parking brake on, and occupancy state.

44) Apparatus system as in claim 43 wherein;

- a) said controller algorithm progressively triggers at least one of an interior vehicle warning, an exterior warning, a passenger/animal relief measure, followed by said passenger/animal release activator;
- b) wherein said interior warning is selected from actuators for a voice announcement, a warning sound, and an illuminated warning;
- c) said exterior warning is selected from actuators for flashing vehicle lights, sounding a horn, sounding an alarm system siren, and an RF call out; and
- d) said passenger/animal relief is selected from actuators for opening at least one window or

roof panel, turning on a fan, turning on a vehicle AC system, deploying shading, darkening or increasing reflectivity of windows, and providing location information to rescuers.

45) Apparatus system as in claim 43 wherein said occupancy state sensor comprises at least one of an ultrasound sensor, an IR sensor, an imaging sensor, a microphone, a seat sensor, a floor sensor, a capacitance sensor, and a motion sensor, and said interior passenger space temperature data is extracted from the return signal output from said ultrasound sensor.

46) System as in claim 28 wherein said occupancy state sensor comprises a linear array of transducers, and the input to the controller therefrom is selectively evaluated for at least one of a Head Zone, a seat zone, a floor zone and side scan for window position.

53) Method of assisting in the location and release of an occupant from a vehicle involved in flooding, submergence, inversion or wreck comprising the steps in any operative sequence of:

a) sensing a vehicle condition selected from vehicle accelerometer activity or history, water flooding or submerged conditions, crush or wreck condition, vehicle stopped, vehicle ignition state, vehicle electrical system activity, odometer activity, amount of road vibration, GPS location updates, engine activity, external motion sensing, trunk or door open/closed, parking brake on, and occupancy state or state history; and

b) triggering at least one of a passenger release measure and an external RF message to rescue/emergency personnel in response to evaluating said sensed vehicle condition.

End of Section 3, Status of Pending Claims.